

REMARKS

In view of the above amendments and the following remarks, reconsideration and further examination are respectfully requested.

I. Claim Amendments

Claims 1 has been amended to clarify features of the invention recited therein and to further distinguish the present invention from the references relied upon in the rejections discussed below.

Support for the above mentioned amendments can be found from the following disclosures of the specification. Lines 3 and 4 of page 16 state that Fig. 2E shows a lamination plate 6b and metal foil 5b made of copper. Further, lines 7-9 on page 17 state that stainless steel, having a coefficient of linear expansion of $10 \times 10^{-6}/C^{\circ}$, is employed for lamination plates 6a and 6b. Moreover, line 27 of page 3 to line 1 of page 4 states that the coefficient of linear expansion of the metal foil (e.g. copper foil) is $18 \times 10^{-6}/C^{\circ}$. Finally, in view of the above identified disclosures of the specification, it is submitted that the coefficient of linear expansion of stainless steel, which is $10 \times 10^{-6}/C^{\circ}$, is smaller than the coefficient of linear expansion of copper metal foil, which is $18 \times 10^{-6}/C^{\circ}$. Therefore, it is respectfully submitted that the newly added limitations (i.e., that the thermal expansion coefficient of the pair of lamination plates is smaller than the thermal expansion coefficient of the copper metal foil) are in fact sufficiently described in the specification.

II. 35 U.S.C. § 112, First Paragraph Rejection

Claims 1-4 and 6-16 were rejected under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement. Specifically, claim 1 was rejected for reciting “wherein the thermal expansion coefficient of the pair of lamination plates is different from a thermal expansion coefficient of the metal foil.” This rejection is believed clearly inapplicable to claim 1 and the claims that depend therefrom for the following reasons.

Initially, Applicants note that, as described above, page 16, lines 3 and 4, page 17, lines 7-9 and pages 3 and 4 provide support for the limitation that the thermal expansion coefficient of the pair of lamination plates is different (now recited as being “smaller”) from the thermal expansion coefficient of the metal foil. As a result, since the limitations of claim 1 are clearly described in the specification, it is submitted that claims 1-4 and 6-16 comply with the written description requirement of 35 U.S.C. § 112, first paragraph. Therefore, withdrawal of this rejection is respectfully requested.

III. 35 U.S.C. § 103(a) Rejections

Claims 1, 3, 6-9, 11 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of the admitted prior art (see pages 1-4, 8 and 9 of the specification) and Pommer. Further, claims 2, 4 and 10-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over various combinations of the admitted prior art, Pommer, Ikeguchi, Shirasawa, Del, Levit, and Hashimoto. These rejections are believed clearly inapplicable to amended independent claim 1 and claims 2-4 and 6-16 that depend therefrom for the following reasons.

Independent claim 1 recites a method of manufacturing a multi-layer circuit board including a core circuit board (with a circuit pattern) and a prepreg sheet. Further, claim 1 recites forming a laminated structure from (i) a laminated member including the core circuit board and the prepreg sheet and (ii) a pair of lamination plates, the laminated member being sandwiched between the pair of lamination plates. Claim 1 also recites that the laminated member further includes a layer of metal foil on both surfaces thereof that are sandwiched between the pair of lamination plates, such that each layer of metal foil is sandwiched between the pair of lamination plates. Claim 1 also recites that the thermal expansion coefficient of the core circuit and the thermal expansion coefficient of the pair of laminations plates sandwiching the core circuit are the equivalent. Further, claim 1 recites that the metal foil is made of copper and recites that the thermal expansion coefficient of the pair of lamination plates is smaller than a thermal expansion coefficient of the copper metal foil.

Initially, please note that the above-described 35 U.S.C. § 103(a) rejection acknowledges that the admitted prior art fails to disclose or suggest the features of the thermal expansion coefficient, as recited in previously presented claim 1. In light of the above, the present rejection relies on Pommer for teaching the above-mentioned features that are admittedly lacking from the admitted prior art. However, in view of the above-identified amendments to claim 1, which further limit the requirements of the various thermal expansion coefficients, it is submitted that Pommer fails to disclose or suggest the above-mentioned distinguishing features now required by amended claim 1.

Rather, Pommer merely teaches that an alignment plate 10 is used to laminate layers 30 by stacking and sandwiching layers 30 between release sheets 22 and 24 (see Fig. 1 and col. 1, line 66 to col. 2, line 2). Further, Pommer teaches that the alignment plate 10 preferably has the same thermal expansion coefficient as the layers 30 (see col. 2, lines 3-5). Additionally, Pommer teaches that it is preferable that each layer 30 has a similar thermal expansion coefficient, so that each layer 30 will expand in a similar manner (see, col. 2, lines 44-49).

Thus, in view of the above, although Pommer teaches that each layer 30 and the alignment plate 10 have a similar thermal expansion coefficient, Pommer still fails to disclose or suggest specifically that the thermal expansion coefficient of the core circuit board is equivalent to that of the pair of lamination sheets, as recited in claim 1.

In other words, Pommer fails to disclose or suggest any thermal expansion coefficient equivalency between the core circuit board and the pair of lamination sheets, as required by claim 1, because the layers 30 and the alignment plate 10 of Pommer are not the same as the core circuit board and the pair of lamination sheets as recited in claim 1.

Applicants note that page 4 of the Office Action states that the specification defines the term “equivalent” on page 13, lines 17-20 to mean “that the thermal expansion coefficient of a lamination plate has a permissible range of $\pm 20\%$ with respect to that of a core circuit board.”

In other words, the Office Action interprets the claim limitation “equivalent” to mean a permissible variance of $\pm 20\%$. Further, the Office Action states that, since the claim limitation “equivalent” means that there can be a variation, then Pommer’s disclosure of thermal expansion coefficients that are approximately the same is actually a disclosure of thermal expansion

coefficient that are “equivalent.” Regarding this position set forth in the Office Action, the Applicants have two points of argument.

First, as mentioned above the Applicants respectfully submit that Pommer does not teach that the thermal expansion coefficient of the the core circuit board is equivalent to that of the pair of lamination sheets, but rather discusses the relationship between the thermal expansion coefficients of the layers 30 and the alignment plate 10. In other words, the layers 30 and the alignment plate 10 of Pommer are not the same as the core circuit board and the pair of lamination sheets, as recited in claim 1.

Second, Applicants note that, if the logic that “equivalent” means $\pm 20\%$, then the term “smaller,” as recited in claim 1 should indicate that the thermal expansion coefficients of the core circuit board and the pair of lamination sheets are not equivalent, but are different beyond the scope of “equivalent.” However, page 4 of the Office Action (last paragraph) relies on the permissible range of $\pm 20\%$ for also teaching that the thermal expansion coefficients are different/smaller. The Applicants respectfully disagree, because the definition of “equivalent” cannot be relied upon for teaching both a relationship that is “equivalent,” and a relationship that is “different/smaller,” as required by claim 1.

Therefore, it is submitted that although Pommer teaches that the metal foil and the lamination sheets have the same thermal expansion coefficient, Pommer does not disclose or suggest that the thermal expansion coefficient of the pair of lamination plates is smaller than the thermal expansion coefficient of the copper metal foil, as recited in claim 1.

Therefore, because of the above-mentioned distinctions it is believed clear that claim 1 and claims 2-4 and 6-16 that depend therefrom would not have been obvious or result from any combination of the admitted prior art and Pommer.

Furthermore, there is no disclosure or suggestion in the admitted prior art and/or Pommer or elsewhere in the prior art of record which would have caused a person of ordinary skill in the art to modify the admitted prior art and/or Pommer to obtain the invention of independent claim 1. Accordingly, it is respectfully submitted that independent claim 1 and claims 2-4 and 6-16 that depend therefrom are clearly allowable over the prior art of record.

Regarding dependent claims 2, 4 and 10-16, which were rejected under 35 U.S.C. § 103(a) as being unpatentable over the admitted prior art and Pommer in view of various combinations of Ikeguchi, Shirasawa, Del, Hashimoto, and Levit (secondary references), it is respectfully submitted that these secondary references do not disclose or suggest the above-discussed features of independent claim 1 which are lacking from the admitted prior art and Pommer. Therefore, no obvious combination of the admitted prior art and Pommer with any of the secondary references would result in, or otherwise render obvious, the invention recited in independent claim 1 and the claims that depend therefrom.

IV. Conclusion

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance and an early notification thereof is earnestly requested. The Examiner is invited to contact the undersigned by telephone to resolve any remaining issues.

Respectfully submitted,

Toshiaki TAKENAKA et al.

/Andrew L. Dunlap/

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Andrew L. Dunlap
Registration No. 60,554
Attorney for Applicants

ALD/led
Washington, D.C. 20005-1503
Telephone (202) 721-8200
Facsimile (202) 721-8250
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